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*Publication date:*  
2018

*Document Version*  
Publisher's PDF, also known as Version of record

[Link to publication in Tilburg University Research Portal](#)

*Citation for published version (APA):*  
van Soest, A., Prast, H., & Rossi, M. (2018). *Pension Communication in the Netherlands and Other Countries*. (Netspar Discussion Papers; Vol. 07/2018-036). NETSPAR.

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# Pension Communication in the Netherlands and Other Countries

Steven Debets, Henriette Prast, Maria Cristina Rossi and Arthur van Soest

**NETSPAR** ACADEMIC SERIES

## **Pension Communication in the Netherlands and Other Countries**

Steven Debets,<sup>§</sup> Henriette Prast,<sup>§</sup> Maria Cristina Rossi\* and Arthur van Soest<sup>§</sup>

**July 2018**

### **Abstract**

In many countries, pension reforms reduce the generosity of collective pensions and shift the responsibility for an adequate standard of living after retirement to individuals and their households. Individuals have to make more decisions than before on supplementary pension savings, on how to invest their DC pension assets, etc. Making such decisions is challenging, since retirement planning requires intertemporal decision-making under uncertainty and is subject to behavioural and psychological biases. Many studies in different countries have shown that the large majority lack the interest, knowledge, or skills to make such decisions in a way that is in their own best interest.

Governments and the pension industry try to assist individuals in making the right decisions through pension communication. This paper focuses on experiences with pension communication, and the lessons to be learned from them. First, the paper provides an overview of the literature, addressing how pension communication is organized across countries and what can be said about its efficiency. Second, using Dutch longitudinal data at the individual level, we analyse the relations between communication (receiving an annual pension overview), pension knowledge, and conscious pension decision-making. We investigate associations and aim at estimating causal effects exploiting the timing of events.

JEL codes: D14, D83, H55

Keywords: Pension saving, involvement, pension knowledge, ageing, retirement

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## **1. Introduction**

In the Netherlands and many other countries, recent pension reforms and other labour market changes have made automatic mandatory pension saving less generous (see, e.g., OECD, 2016). State and occupational pensions often still provide a basic income after retirement, but often do not lead to a sufficient retirement income replacement rate for maintaining their standard of living. Individuals increasingly have to take their own responsibility, making decisions on, e.g., supplementary pension savings, how to invest (part of) their pension wealth, or the timing of their (gradual or full) retirement.

For various reasons, making optimal pension related decisions is, to put it mildly, not an easy task (Adams and Rau, 2011). It requires forward looking behaviour under uncertainty, trading off, for example, the short-term gains of current consumption expenditures versus the expected long-term gains of consumption after retirement, with many sources of risk and uncertainty. Already more than ten years ago, Merton and Bodie (2004) argued that US households were increasingly asked to make complex financial decisions, including “asset allocation and the optimal level of life-cycle saving for retirement” that they did “not have to make in the past, are not trained to make in the present, and are unlikely to execute efficiently in the future, even with attempts at education.” Studies in many countries have shown that pension interest, knowledge and awareness are low (see, e.g., Prast and van Soest, 2016). Adding to this is the problem that people may lack the self-control to save and may postpone saving decisions until it is too late (see, e.g., Thaler and Shefrin, 1981).

Many studies have emphasized the possibilities to help individuals to make pension related decisions that are in their own long-term interest. Studies have shown that context, timing, defaults, the order and steps in the decision process have large effects on pension saving and ultimate choice outcomes (“choice architecture”, see, e.g., Thaler and Benartzi, 2004). Other studies focus on information provision and pension communication, which can affect involvement as well as the ability to make good decisions – the two necessary conditions for conscious and optimal decision-making, according to the seminal Elaboration Likelihood Model in the literature on consumer decision-making (Petty and Cacioppo, 1986).

The current paper focuses on pension communication. Different countries have organized their pension communication in different ways. What are the experiences and the lessons we can learn from this? What drives the effectiveness of pension communication and (how) does this vary across socio-economic groups? We discuss experiences in several countries and provide an empirical analysis for the Netherlands.

We distinguish between different types of pension communication. On the one hand, we consider general communication aimed at increasing pension literacy and awareness, explaining, for example, the general rules of the pension system or the possible consequences of a pension reform for specific groups. On the other hand, we consider specific, personalized, information such as periodic statements on public, private, or total pension entitlements, or communication activities targeted at specific groups like individuals who change jobs or who recently got married or divorced.

The first part of the paper provides an overview of international experiences in the literature (Section 2), addressing the following questions: How do different countries organize their pension communication and how does this evolve over time? What are the differences and similarities across countries? What are the goals of different forms of pension communication? Is efficiency measured and if so, how? Are the communication campaigns effective, for the target group as a whole and for specific subgroups, such as younger/older age groups, men/women, high/low educated individuals, financially literate/illiterate individuals, singles/ couples, etc.? Is there a difference in effectiveness across the various types of pension communication?

The second part presents an empirical analysis for the Netherlands. We analyse the relation between communication, pension awareness, knowledge of pension reforms, and pension related decisions, using a representative panel of the Dutch adult population covering the years 2004-2016, the DNB Household panel. Section 3 describes these data. In the time-period covered by the panel, the mandatory uniform pension overview (UPO) has been introduced, an annual overview of pension entitlements for active participants in an occupational pension fund. In Section 4, we analyse the association between receiving a pension overview, pension

awareness, and pension related decisions. Moreover, we try to identify causal effects exploiting the timing of events approach and the panel nature of our data. Section 5 concludes.

## **2. Pensions and pension communication in some European countries**

There is a wide variety of pension systems across European countries, with, e.g., different combinations and relationships between benefits received and pension contributions paid. One of the main indicators describing the pension system is the replacement rate, the pension benefit (paid upon retirement) as a percentage of a worker's pre-retirement income. The replacement rate for median earners shows the highest levels in Denmark (95%), Spain (85%) and Italy (76%). This mainly results from the pre-funded pension schemes and life insurance reserves in Denmark and from the public pension system in the two other countries (Better Finance, 2016).

Pension awareness also varies across countries, and is related to the need of private saving to top up public pension provisions and (mandatory) occupational pensions. Countries with traditionally high replacement rates (around 70%) have invested fewer resources in promoting pension awareness than countries where the typical replacement rate was 50% or lower. The latter are more pro-active in stimulating individuals to consider and use all sources of income, to get the maximum possible retirement income. One example is the UK, where the individuals now draw on their private savings to top up their pension.

The OECD website<sup>1</sup> provides a pension calculator for each of its member countries, based on simulation scenarios: it provides the replacement rate given someone's relative position with respect to the median worker (i.e. the relative income and working history compared to the median worker). This tool is useful, but assumes that the individual's employment history is available. This is the most difficult part, as all persons have their own work background. Each country has their own communication tools to fill this knowledge gap, providing workers with the details needed to project their future individual pension. In general, countries where replacement rates are reasonably high (around 70%) tend to focus their pension knowledge

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<sup>1</sup> <http://www.oecd.org/els/public-pensions/pensionsataglancepensioncalculator.htm>

campaign on the mandatory (state and occupational) pension rather than on the potential of overall wealth. The huge variation in pension systems, however, induces large differences in communication strategies. In the remainder of this section, we illustrate this by discussing the communication strategies in several European countries.

## **Sweden**

Sweden shifted from a DB towards a DC system in 1999, implying a substantial increase in uncertainty on the future amount of pension benefits. To make workers more prepared for the new attitude towards pension required by this transition, the Orange Envelope was introduced in 1999, providing, in addition to the information on pension contribution, an account statement and a fund report for the funded part and a forecast of the future pension.

The Swedish Orange Envelope represents a milestone in pension communication. Indeed after the Swedish experience many other countries aligned to that model by providing their own equivalent to the Orange Envelope. The envelope has a special design and it is sent annually.<sup>2</sup> Sweden has been the first one active in pension information, and the Orange Envelope has now become a brand, a trademark for pensions, receiving considerable media coverage.

Since 1999, an annual survey is administered to monitor the comprehension and use of the Orange Envelope. Approximately 1,000 individuals aged between 18 and 62 are interviewed over the telephone. Results show that most people know about the Orange Envelope (around 90%), but only three fourth say they have opened it and read some content (Larsson et al., 2011). Breaking down the sample into pensioners, general pension savers and new pension savers, the new pension savers show the lowest knowledge level of the pension system, while pensioners are better informed than both general savers and new pension savers (Swedish Pension Agency, 2011). Still, only a minority understand the main principle that lifetime earnings determine benefits.

In order to provide a full pension projection, linking the private pension plans together with the statutory pension, each worker can also make their own projection using the website

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<sup>2</sup> For an example, see: <https://www.pensionsmyndigheten.se/other-languages/en/en/orange-kuvertet-visar-hur-mycket-du-far>

<https://www.minpension.se/>, an independent platform, free of charge for users, funded jointly by the Government and private pension providers. This is generally seen as a success, with 50% of the working population registered as users (Moss, 2016). As reported by AEGON (2014) (surveying 15 countries in the world on retirement preparation), a common complaint from visitors of the Swedish pension website was that data were not provided visually – instead, there was an abundance of text and numbers –, generating difficulties to extract key information.

## **Italy**

In Italy the pension system is structured as a compulsory statutory (Notional Defined Contribution) Pension system, both for employees and self-employed, supplemented by voluntary private and fully funded pension plans at individual and collective levels (Better Finance, 2016). The public pension burden is massive, reaching 18% of GDP, the highest in Europe (OECD, 2017). Given the high pension contribution rate of employees (around 33%), the expected replacement rate is high: 93% of last earnings for an average-wage worker with a full career from age 20 (OECD, 2017). Replacement rates are higher only in the Netherlands, Portugal and Turkey.

Italy has undergone important pension reforms over the last decades. The shift from a defined benefit (DB) system towards a (notional) defined contribution (DC) system goes back to 1991 - 1995 with The Dini reform. A series of reforms started with a slow phasing in of the new rules, implying a less generous DB formula and restrictions on early retirement (Burrone et al., 2016). Further restructuring ultimately resulted in a shift to a Notional Defined Contribution System in 1995.

The pension system had a major push towards a new system after the Monti-Fornero reform in 2011, aimed at signalling stability and reassuring the financial markets of the sustainability of public debt. The retirement age increased to 67. This was a huge change especially for women, whose retirement age used to be five years lower than that of men. In the current system, an employee's future pension is determined by the individual's labour history, as well as general economic (GDP growth) and demographic (general life expectancy) factors. Clear and transparent information is essential in this new framework, where the risk has shifted from



the state to the worker. Accordingly, the European Commission has argued for the need of a clear communication system to assist the individuals with their planning.

Fornero et al. (2018) present the results of a survey administered in July 2014, with more than 40 questions related to pension awareness. The survey is representative of the employees aged 55+. For this age group, pension awareness is mainly aimed at understanding that one has to work more years before receiving a retirement income. Results show that the vast majority (around 93%) of employees were aware of the reform, and the majority (around 65%) agreed with the statement that the reform was needed to counterbalance the consequences of population ageing or imbalances in the social security system.

The Italian Social Security Institute INPS is committed to annually inform each worker of the evolution of their pension and launched *“la mia pensione”* in 2016: Through the INPS website, private sector employees and the self-employed have access to information<sup>3</sup> on the day of retirement, predicted pension benefit (in real terms), predicted replacement rate, the impact of potential career interruptions on future pensions, and scenario simulations showing the consequences of different career patterns.<sup>4</sup> About 6.9 million workers got access to the service, and almost 3.5 million workers actually used it. The INPS ran a survey among 36,000 users of *“La mia pensione”* to evaluate the information service.<sup>5</sup> The sample was equally balanced according to regional residence and age groups (younger than 40, between 40 and 50, and between 50 and 60). Results showed that almost nobody in the sample needed additional help to have access to the pension information on the website. About 60% reported that their knowledge on pensions improved. For the large majority, the pension amount did not come as a surprise.

The Bank of Italy micro dataset (SHIW) measures, for all workers, the expected replacement rate as well as the year in which they expect to retire. More precisely, the following two questions were asked in various waves:

*“At what age do you expect to retire?”*

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<sup>3</sup> Currently, civil servants (a quarter of all employees) are not yet included.

<sup>4</sup> <https://www.inps.it/nuovoportaleinps/default.aspx?itemdir=50033#h3heading1>

<sup>5</sup> [https://www.inps.it/docallegatiNP//Mig/Allegati/375La\\_valutazione\\_del\\_servizio\\_la\\_mia\\_pensione.pdf](https://www.inps.it/docallegatiNP//Mig/Allegati/375La_valutazione_del_servizio_la_mia_pensione.pdf)

*“What will be the percentage of your first year of pension benefits with respect to earnings gained the year before retirement?”*

Baldini et al. (2016) exploit these questions to analyse how well Italian workers are aware of their pensions. They focus on the discrepancy between individuals’ subjective expectation and the correct objective expectation of the pension eligibility age (the retirement age) and the (pension) replacement rate, the two main sources of uncertainty. They found that in 1989, almost 90% of workers interviewed were able to correctly report their retirement age. This percentage was much lower in 2000, 77%, after the first wave of reforms. In the next decade, the proportion of correct answers increased continuously, but after the introduction of the link between retirement age and life expectancy in 2010 it again decreased abruptly.

In 2014, approximately 60% predicted their retirement age correctly, but only 40% predicted both eligibility age and replacement rate correctly. Given that it was introduced only recently, it is too early to evaluate the impact of the recent information campaign; its monitoring and implementation have just started and the campaign certainly has the potential to change the shape the planning of private saving (not only on life insurance).

## **Austria**

In Austria, the defined benefit state pension is by far the largest source of pension income. In 2004, a law was introduced aimed at harmonizing pensions for all occupational categories including the self-employed, with compulsory and uniform contribution rates and benefit entitlements for workers born after 1955. The primary goal of maintaining the standard of living after retirement was maintained. The system is based on the 80/45/65 rule: an 80% gross replacement rate for people who have paid 45 years of social security contributions and retire at 65 (Knell, 2013). It also entails means tested social benefits for pensioners with insufficient income and pension entitlements (Blank et al., 2016).

The reform in 2004 has increased the retirement age by closing the windows of early retirement and by increasing the retirement age of women to 65, starting between 2024 and 2034 at a half year pace of phasing in. In the new system, lifelong accounts are counted for the final benefit. The harmonized system will gradually replace the different pension schemes for

private sector employees, self-employed, farmers and civil servants. Cohorts born in 1955 or later have individual pension accounts with their complete contribution history and entitlements. The right to pension information is written in the General Pension Act. The Austrian pension information system targets all insured persons born in 1955 or later and with at least one month of insured work. Individual pension information can be obtained online, or in person at the social security institutions.

Knell et al. (2015) exploit the pension information campaign in 2013, when the Pension Insurance Agency sent a letter to insured individuals born between 1958 and 1990 providing them with information on their future pension. A survey among 2000 individuals, both retirees and workers, was conducted early in 2014, to check the level of pension knowledge after the communication campaign of 2013. A number of questions related to knowledge about the system, labour market history, and retirement expectations were asked. The analysis shows that, on average, respondents understand that the retirement age will gradually increase, in line with increasing life expectancy. On the other hand, uncertainty about their future net pension replacement rates is high and people do not fully understand the new pension rules. In particular, they underestimate the importance of the contribution period to determine the pension level and hence the size of deductions for early retirement (on average 3.5% instead of 7%). They conclude that pension information could be improved, for example by showing how an individual's pension income changes when varying the retirement age.

## **The United Kingdom**

The UK has undergone a reform of the pension system allowing much more freedom on how to withdraw pension assets at retirement. The *first-pillar* pension is two-tiered: the basic state retirement pension (determined by the National Insurance contribution history); the State Second Pension (S2P), and the Pensions Credit. There is no specific legislation on state pension information, while information about supplementary pensions is established by the Pension Schemes Act 1993.

Pensions statements (forecasts) are available on request either online ([www.gov.uk](http://www.gov.uk)) or as a pension calculator, which generates the forecasts of both the state pension age and the

amount of basic state pension (in today's money). For the supplementary pensions, their providers, who are required to furnish pension information by law, may use the channel they prefer to communicate with their subscribers. Usually, the information is provided either by mail or online.

Starting in 2015, UK workers can withdraw their entire pension pot once they reach the age of 55, leaving an unprecedented level of freedom in the use of pension wealth, without obligation to transform it into an annuity. The tax rule, however, deters full withdrawal, since the amount exceeding 25% of the pension pot is taxed. In this scenario, the risk of running out of money can be very serious and misinformation on how to correctly annuitize is essential. In this context, there are several free pension guides and websites that allow calculating the full pension amount (adding up State Pension and DC pension).<sup>6</sup>

The state Pension Institutions on their webpage allow free guidance into pensions to give an overall picture of all pensions available and offer guidance for advice from the Financial Conduct Authority (FCA) website (<https://www.pensionwise.gov.uk/en/financial-advice>).

## **The Netherlands**

The Dutch pension system consists of three layers. The bottom layer is a state income arrangement *independent* of work history and based upon the number of years the individual has lived in the Netherlands. It implies a gross monthly income, starting at the statutory retirement age, of around 1,250 euros for a single and 1,700 euro for a couple.<sup>7</sup> The arrangement was originally financed fully by mandatory pay-as-you-go premiums of workers. Since the 1990's, changing demographics and rising life expectancy have made it necessary to supplement this with funding through the government budget.<sup>8</sup>

The second layer is a mandatory fully funded occupational pension arrangement: If a company offers a plan, employees are obliged to participate. As around 95% of companies offer

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<sup>6</sup> See, e.g., <https://www.standardlife.co.uk/c1/guides-and-calculators/pension-calculator.page>

<sup>7</sup> [https://www.svb.nl/int/nl/aow/hoogte\\_aow/bedragen/#vtma1](https://www.svb.nl/int/nl/aow/hoogte_aow/bedragen/#vtma1)

<sup>8</sup> Currently, 12 billion euros, about one third of the total amount. See [http://www.rijksbegroting.nl/2017/voorbereiding/begroting,kst225925\\_35.html](http://www.rijksbegroting.nl/2017/voorbereiding/begroting,kst225925_35.html)

a plan, almost all employees are plan members. There is no choice on the amount of savings or the pension portfolio. Pension premiums for the second layer are paid by both employees and employers. They are tax-facilitated up to a maximum. In the past, retirees could count on a replacement rate of 70% gross and 90% net (income of retirees is taxed at a lower rate). Indexation of pension claims to cost-of-living increases was the rule. In bad times, a small increase in the savings rate of employees was sufficient to guarantee retirement income of the retired. When baby-boomers started to retire, however, the ratio between workers and retirees fell dramatically. Nowadays, if the coverage ratio of a pension fund falls below a critical level, it must lower retirement income payments. Indexation of pension claims to cost-of-living increases is no longer common and in recent years, many pension funds have even reduced nominal pension levels due to too low coverage ratios. State and occupational pensions are paid as a lifelong annuity; there is no possibility to choose a lump sum.

Because of the large mandatory saving, the third layer, individual voluntary pension saving, is small. For groups with low occupational pension savings relative to their income, third layer pension savings are tax-favoured. This mainly applies to the self-employed. Starting a few years ago, the statutory retirement age has increased gradually, from 65 years in 2013 to 67 years in 2021. In the future, it will be linked with general life expectancy. Almost all occupational pension funds allow for an earlier claiming age in case of early retirement, at an actuarially neutral reduction of the annuity.

Pension communication started to become an issue when it became clear that pension knowledge in the Netherlands was low. A report by the Socioeconomic Council concluded that even in a mandatory system, situations may arise where action is required to prevent an inadequate pension. Examples are a divorce, a change of jobs, or a change in the characteristics of the employer pension plan, e.g. during the 1990s when pension funds started to move from an end of career wage to an average career wage system. A law on pension communication was passed in 2005 and became effective in 2007. It focuses on the individual pension income prospects rather than characteristics of the pension system, mandating the pension industry to

provide plan members with a yearly Uniform Pension Overview (UPO)<sup>9</sup> as of 2008. The underlying idea was that if employees have pension claims from various funds, a uniform way of presenting information would facilitate them in calculating their projected pension income. One of the explicitly stated goals of the mandated pension communication was that of *enabling stakeholders to make an adequate financial planning* (Heuts and Klaver, 2011). Pension funds had to send the UPO in a hard copy to plan participants.

The law also required the pension industry to set up an online pension register, as of 2011. Here individuals can find information online on all their first and second pillar pension rights in terms of the amount that they can expect to receive if they will continue working in their current job until the age of retirement.<sup>10</sup> The information is on the level of the individual, not the household. The ultimate goal of the legislation was to induce people to take action if needed by increasing pension awareness: *“the extent to which one is aware of pension income, knows whether this is sufficient in one’s personal situation, knows what can be done to solve potential problems, and makes a deliberate decision whether or not to act.”* To assess the effect of the mandated pension communication, a pension-awareness index was introduced, measuring knowledge about the individual pension. The index in the years 2009-2011 showed no improvement at all in pension awareness (Wijzer in geldzaken, 2014). An evaluation by the Dutch government (Heuts and Klaver, 2011) concluded that improvements in communication strategy were needed to achieve the ultimate goal of better pension preparation. Based on an international survey of over 50,000 employees, Towers Watson (2012) concluded that pension awareness among the Dutch was low in an international perspective.

In 2015 a new Act on Pension Communication was passed,<sup>11</sup> with changes to format and content of the UPO. The government’s motivation for the new law was to improve information about pensions, by putting the individual plan member’s perspective at the centre stage. Moreover, the goal of pension communication became less ambitious in terms of inducing

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<sup>9</sup> See Article 51 of the 2005 Pension Act.

<sup>10</sup> The register shows pension claims at the individual, not the household level.

<sup>11</sup> [https://www.eerstekamer.nl/9370000/1/j9vvhwtnbznzbzcc\\_j9vvkfj6b325az/vjubbxob2zwx/f=y.pdf?https://www.eerstekamer.nl/9370000/1/j9vvhwtnbznzbzcc/vjubbxob2zwx/f=y.pdf](https://www.eerstekamer.nl/9370000/1/j9vvhwtnbznzbzcc_j9vvkfj6b325az/vjubbxob2zwx/f=y.pdf?https://www.eerstekamer.nl/9370000/1/j9vvhwtnbznzbzcc/vjubbxob2zwx/f=y.pdf)

behavioural change if needed. The new goal is that plan members know how much pension they can expect to get, can verify whether it is sufficient, and are aware of the risks of the pension arrangement. Moreover, pension communication should show the plan members which choices they have (Prast and Teppa, 2017).

The 2015 Act allows the pension industry to choose between providing the UPO on paper, electronically, or both. Pension communication on the website is offered in three formats (Pension 1-2-3). Pension 1 contains what is considered key information that can be read in 5 minutes, Pension 2 (30 minute reading) provides this information in more detail, while Pension 3 also contains relevant background documents, for instance the pension fund's annual report.<sup>12</sup> These different levels are assumed to meet the varying needs of heterogeneous plan members. As to the content, according to the 2015 Pension Communication Act (Article 51), the UPO and the pension register should provide information about individuals' future pension income in three scenarios: a realistic, an optimistic, and a pessimistic one, making uncertainty of pension income explicit. This is triggered by the fact that second layer pensions are much more risky than they were in the past, as discussed above. However, thus far no consensus has been reached on which calculation method to use, implying that the risk scenario information is not (yet) provided in the UPO. The new legislation is too recent to draw conclusions on its effects on pension knowledge, let alone behaviour.

A challenge in the Netherlands is the growing group of self-employed who are not covered by an occupational plan - indeed, pension coverage among the self-employed is rather low. There are pension funds for traditional groups of independent professionals (by category, for example for specialized doctors), and all professionals are required to become a plan member if 60% of the profession agrees. However, there is no equivalent for the new self-employed who, as a group, are very heterogeneous and do not belong to a professional organization. Current pension communication legislation focuses on second layer pensions, to which these groups do not have access.

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<sup>12</sup> <https://www.pensioenfederatie.nl/paginas/nl/openbaar/themas/pensioencommunicatie/pensioen-1-2-3>

It can be concluded that the characteristics and essentials of pension communication in the Netherlands reflect the country's pension system and explain the focus on projected pension income. The Dutch system differs in some important respects from those in many other countries. The first is that the first layer is unrelated to work history. The second is that almost all employees are mandatory participants in the second layer, with no choice as to the savings rate or portfolio. Employees must rely on pension income projections by their fund and make individual arrangements if they deem the pension inadequate.

### **3. Empirical analysis for the Netherlands: Data and Descriptive Statistics**

We use longitudinal data on individuals to analyse the relations between receiving a uniform pension overview (UPO), objective and subjective measures of pension literacy, and a measure of active pension planning. The data are taken from the DNB Household Survey (DHS), part of the CentERpanel administered by CentERdata at Tilburg University. The panel contains roughly 2,000 households whose members fill out short questionnaires on a weekly basis (biweekly since 2017) via the Internet. The DNB Household Survey collects annual data since 1993, on "income, wealth, health, employment, pensions, savings attitudes, and savings behaviour." The main variables for our analysis are available since 2004, and we use the 14 waves from 2004 until 2017. We only use information on individuals of ages 20-67 who have not yet retired and have no missing values on basic covariates. Our final dataset is an unbalanced panel of 21,028 observations, providing information on 5797 individuals aged 20-67. Due to missing values, the number of observations used for the regressions will typically be smaller (see below).

#### **Active pension behaviour**

To measure active pension decision behaviour, we use a question on whether people will adjust their conduct if pensions are cut. The question was asked in all waves of the DNB Household Survey (DHS), though only to a small minority in 2014. The wording of the question and possible responses is as follows:

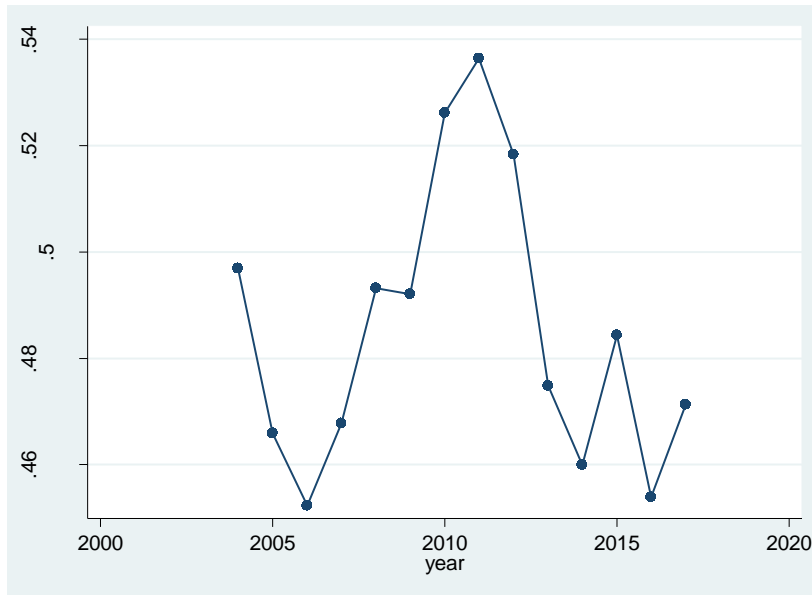


*Will you adjust your conduct if pensions are cut down, for example through an adjustment of indexation, postponing the retirement age or a different pension system?*

*I will put more money aside for my pension / No, I will see what I'll do when it happens / No, I think I can make ends meet fairly easily with the pension I will have / Otherwise, answer:... (string) / Don't know*

Note that this question measures intentions only. If individuals intend to undertake action but procrastinate indefinitely, the answer to the question suggests they are active decision makers while in fact they are not. On the other hand, we prefer to use this variable rather than a variable reflecting actual behaviour, since in the current institutional setting in the Netherlands, many people do not need to make any active pension-related decisions in a given year.

The responses were used to create a binary variable on pension decision making which is equal to one if people claim that they will adjust their behaviour (answer 1; 26.7% of the sample) or made the deliberate decision not to adjust behaviour since they can make ends meet fairly easily (answer 3; 20.1% of the sample). The binary variable is set to zero if the second answer was given (35.2% of the sample), which reflects procrastination in getting involved with pensions and making pension decisions. If individuals answered with answer 5, 'don't know', the binary variable is set to zero as well (14.8% of the sample). Furthermore, the relatively small number of open-ended responses (answer 4, 3.1% of the sample) usually appeared to reflect a non-conscious decision. We therefore also placed them in the zero category.



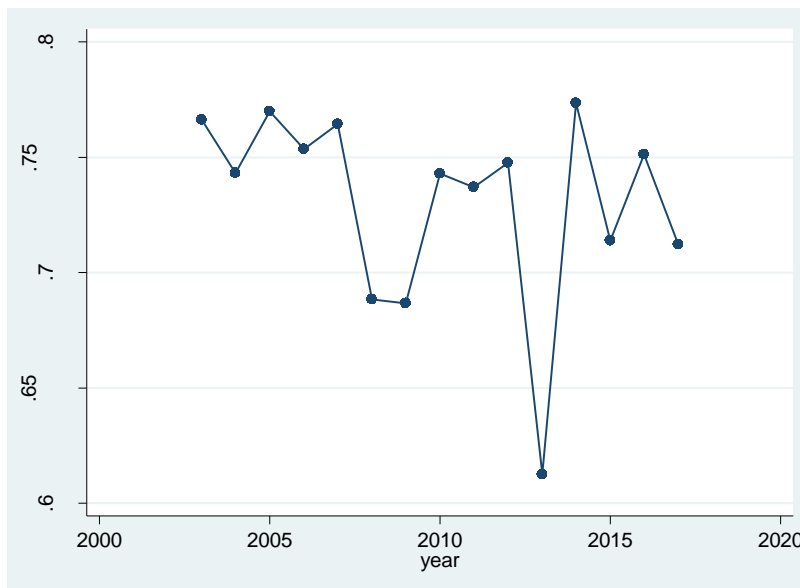
**Figure 1. Active pension behaviour over time**

The overall average of the binary variable for active or conscious pension decision-making created in this way is 0.484. Figure 1 shows how the mean develops over time. There seems to be a peak in conscious pension behaviour around 2011-2012, followed by a substantial drop in the last few years. A possible explanation is that the financial crisis increased uncertainty and induced a public debate on sustainability of pensions and reducing real pension income replacement rates, which may have stimulated individuals to start thinking about their future pension income.

### **Pension communication**

As discussed in the previous section, the uniform pension statement (UPO) provides an overview of accumulated occupational pension entitlements at a given pension fund, similar to the Swedish Orange Envelope. Since 2008, pension providers are obliged to send a UPO to all their active participants, but many pension funds already started sending their overviews earlier. Our measure for pension communication is a binary response variable which is equal to one if the respondent reports that he or she has received a UPO in a particular year and zero otherwise. (The answers to this question do not allow for the option: 'don't know'.) In our sample, 73.0%

reported having received a pension overview. Surprisingly, Figure 2 shows that there is no increasing trend over time, in spite of the fact that sending the UPO to active participants became mandatory in 2008. Moreover, the percentage in 2013 is substantially lower than in other years.



**Figure 2. Sample fraction that received a (uniform) pension overview**

### Pension literacy

To assess members' overall knowledge of their own pension arrangement, we use three questions on pension knowledge from DHS. Respondents could reply to each of them with a specific answer or 'don't know'. Since we do not have information on the respondents' actual arrangements, we assume that all specific answers are correct and that only the "don't know" answers reflect lack of knowledge. The three questions used to address pension literacy are the following:

*How is your pension built up?*

*Pension based on the final pay / Pension based on the average pay earned during my working career / Defined contribution / Don't know*

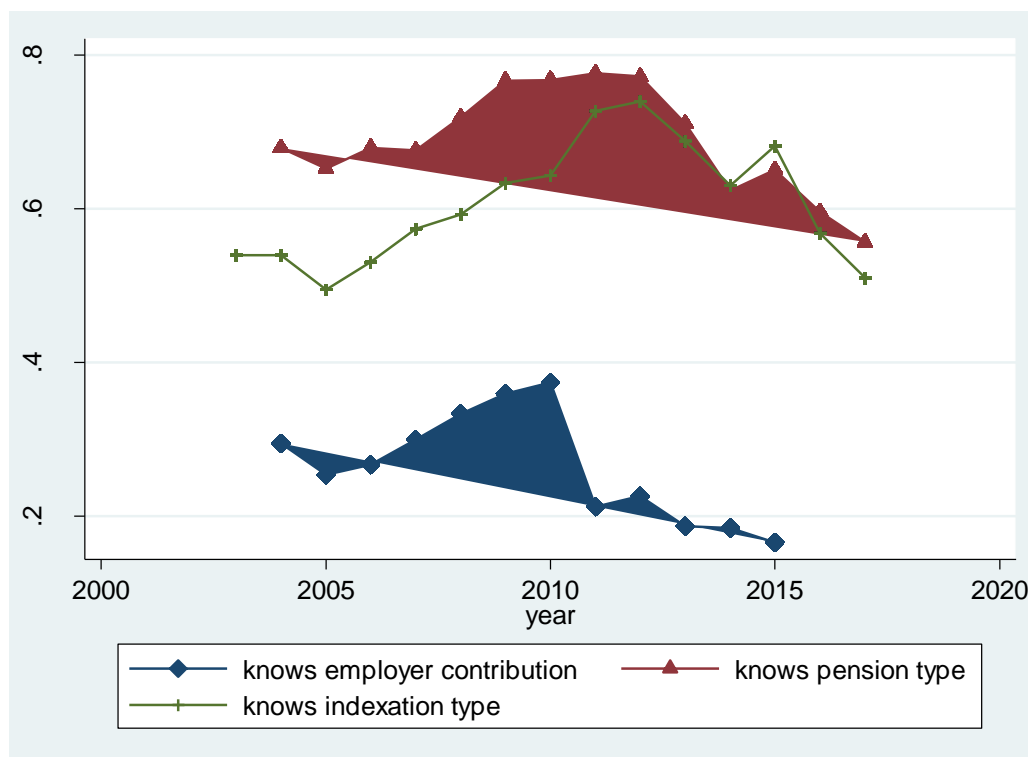
*Which part of the pension premium (in percentage points) is paid by the employer?*

*Open-ended answer / don't know<sup>13</sup>*

*A pension plan can include an arrangement for correcting the pension that can be claimed and/or the pension that is actually being paid according to a price-index and/or to a salary-index. Pensions that are corrected in this way are called indexed to inflation. Is your (future) retirement pension indexed to inflation?*

*Yes, price index / Yes, salary index / Yes, both salary and price index / Don't know*

An answer other than “don’t know” was given in 68.3%, 26.8% and 60.4% of all observations for the first, second and third question, respectively. Figure 3 shows the development over time. The trend seems to be increasing until 2010 but decreasing afterwards.



**Figure 3. Pension literacy questions: fraction of answers other than “don’t know”**

<sup>13</sup> This question is not available for 2016 or 2017.

The first pension literacy index (*pen\_lit*) we will use in the analysis is the number of answers other than “don’t know”, with value 0, 1, 2 or 3. In 20.5% of all cases, each question is answered with “don’t know” and the index has value 0. In 22.1%, 37.6% and 20.0% of all cases, the index has value 1, 2 and 3, respectively. This index has the drawback that it cannot be used for 2016 and 2017, when the question on the employer distribution was not asked. We therefore also use the index based upon the other two (relatively easy) questions only. This index has values 0, 1 and 2 in 22.8%, 25.5 and 51.7% of all cases, respectively.

### **The feeling of being informed**

The feeling of being informed about one’s pension is a subjective indicator of pension knowledge that might play a role mediating the effect of pension communication on pension decision making. We created a variable (*feel\_informed*) for this with a score from 1 (feel no need to be informed, we’ll see), 2 (not well-informed) to 6 (well-informed) from the following DHS question:<sup>14</sup>

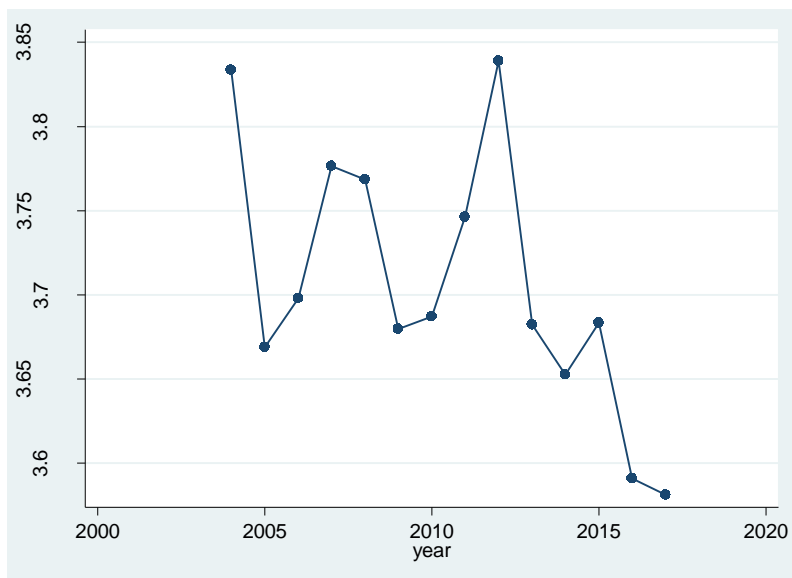
*Do you feel adequately informed about your (future) pension arrangements?*

*Well informed / More than adequately informed / Adequately informed / Moderately informed / Not well-informed / Feel no need to be informed, we'll see*

25.8% of the observations report that they feel well informed or more than adequately informed. The modal outcome is adequately informed (36.3%), while 19.7% feel moderately informed” and 8.2% feels “not well informed” and 10.3% “feel no need to be informed.” In the analysis, we treat the answers as numerical variable (ordered from “feel no need to be informed” to “very well informed”). Figure 4 suggests that the feeling of being informed about one’s pension arrangement falls over time. As expected, this subjective index of pension knowledge is positively correlated with the objective pension knowledge index based upon the three questions in Figure 2; the correlation coefficient is 0.344.

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<sup>14</sup> We reversed the original scale to simplify interpretation.



**Figure 4. Average feeling of being informed about one's pension arrangements**  
**(1: no need to be informed, 2: not well-informed, ... 6: well-informed)**

#### 4. Regression Models

In this section, we consider panel data models that analyse the relations between our main variables of interest: pension communication (in particular receiving a pension overview), pension knowledge (objectively measures pension literacy or the subjective feeling of being informed), and our measure of active pension behaviour (the question whether someone will adjust their behaviour if pensions are cut). In Sections 4.1, we consider models for pension knowledge. In Section 4.2, we focus on active pension decision-making.

##### 4.1 Models explaining pension knowledge

Table 2 presents the results of standard static random effects (RE) and fixed effects (FE) linear models explaining our objective indexes of pension knowledge counting the number of questions on pension knowledge that are not answered by “don't know” among all three or two of the three questions on knowledge of the respondent's own pension (see Figure 3). The main explanatory variable of interest is the dummy for whether someone reported that he or she

received a pension overview (*received\_UPO*). As control variables, we also added a dummy for main wage earners, household size, dummy variables for home ownership and being married, a dummy for self-employment and a dummy with value 1 if the respondent sees paid work as his or her main occupational status. All models also contain a full set of time dummies. The estimates of the coefficients on these time dummies are not reported, since they reflect the pattern seen in Figure 3. In the random effects models, we also include age, a dummy for females, and dummies for several education levels. These are not included in the fixed effects models since they hardly vary over time (education level), do not vary over time at all (female), or are almost collinear with the time dummies (age). The bottom part of the table shows that individual effects capture more than half of the unsystematic variation in pension knowledge, since the estimated standard deviation of the individual (fixed or random) effect is larger than that of the error term.

The main finding in Table 2 is the significantly positive coefficient on the dummy for receiving a pension overview. Respondents who report that they received a pension statement score significantly better on the pension literacy questions, keeping other factors constant (including the time invariant unobserved characteristics captured by the individual effects). The size of the coefficient is not huge – the predicted score on the index using all three questions increases by 0.134 according to the RE estimates and 0.100 according to the FE estimates, while the standard deviation of the pension literacy index is 1.03. Whether the estimates reflect a causal effect of communication on knowledge remains to be seen; for example, it is possible that respondents who get more interested in pensions not only know more about pensions, but also remember better that they received a pension statement.

Table 2. Random and fixed effects models explaining the objective measures of pension literacy

	Pension literacy (3 questions)		Pension literacy (2 questions)	
	RE	FE	RE	FE
received_UPO	0.134 (0.019)**	0.100 (0.021)**	0.111 (0.014)**	0.069 (0.016)**
main_earner	0.039 (0.029)	-0.018 (0.042)	0.034 (0.020)	0.001 (0.029)
hh_size	-0.010 (0.011)	0.028 (0.021)	-0.008 (0.008)	0.005 (0.015)
own_house	0.238 (0.030)**	0.149 (0.052)**	0.188 (0.022)**	0.133 (0.040)**
married	0.064 (0.027)*	0.050 (0.041)	0.041 (0.019)*	0.041 (0.030)
self_employed	-0.012 (0.055)	-0.019 (0.071)	-0.095 (0.038)*	-0.107 (0.051)*
paid_work	0.105 (0.025)**	0.043 (0.033)	0.053 (0.017)**	0.005 (0.021)
lower_secondary_educ	0.211 (0.088)*		0.134 (0.065)*	
pre_univ_secondary_educ	0.432 (0.092)**		0.259 (0.068)**	
higher_vocational_educ	0.462 (0.088)**		0.312 (0.065)**	
university_educ	0.613 (0.093)**		0.390 (0.068)**	
female	-0.357 (0.031)**		-0.274 (0.022)**	
age	0.022 (0.001)**		0.020 (0.001)**	
<i>Sigma(individual effect)</i>	0.6944	0.9364	0.5394	0.7434
<i>Sigma(error term)</i>	0.6014	0.6014	0.5012	0.5012
<i>Observations</i>	12,674	12,674	17,125	17,125
<i>Individuals</i>	4001	4001	4931	4931

\*  $p < 0.05$ ; \*\*  $p < 0.01$ . Dependent variable: number of answers other than “don’t know” to all three / two of the three questions on pension knowledge. Standard errors in parentheses clustered at the individual level and robust to heteroscedasticity. Time dummies included in both specifications but not presented. Paid\_work: 1 if respondent sees paid work as the main activity, 0 otherwise. Other controls are self-explanatory.



Home ownership is positively associated with pension knowledge, probably since buying a house induces people to study their long-term financial situation, including their future pension. Household composition is not significantly associated with pension literacy. Paid work plays a significant role in the RE model only, suggesting that respondents who see paid work as their main occupational status also tend to know more about pensions but not necessarily because of a causal mechanism. The RE results show that, as expected, pension knowledge is strongly positively associated with the level of education. Moreover, it is substantially larger for men than for women with the same other observed characteristics. These findings are in line with the literature on financial literacy in general (e.g., Bucher-Koenen et al., 2017). Finally, pension knowledge increases with age, reflecting the common finding that individuals of working age get more involved with pension issues the closer they come to retirement. Finally, using only two questions on pension literacy (and two additional waves of observations) gives qualitatively very similar results.

Table 3 presents the results of similar models as in Table 2, but now explaining the subjective pension knowledge variable reflecting to what extent respondents feel informed about their pension (*feel\_informed*, cf. Figure 4). The main result is the same as in Table 2: there is a significant positive association between receiving a pension overview and feeling informed about pensions. The coefficient is substantial and even more significant than in Table 2, particularly according to the RE estimates. Similarly, the other results are qualitatively similar to those in Table 2. According to the RE model, older, higher educated, and male individuals feel better informed than their counterparts. In the fixed effects models, household and employment characteristics are insignificant, possibly due to lack of variation over time in these variables. For example, being married and home ownership are positively associated with subjective pension knowledge, but the FE estimates are not significant, so changes in marital status or home ownership are not significantly related to changes in subjective pension knowledge.

Table 3. Random and fixed effects models explaining subjective pension literacy

<i>Dependent Variable:</i>	RE		FE	
<i>Feel informed</i>	Estimate	St. error	Estimate	St. error
received_UPO	0.303	0.021**	0.166	0.023**
main_earner	0.134	0.031**	0.017	0.047
hh_size	-0.024	0.013	-0.027	0.023
own_house	0.224	0.034**	0.034	0.064
Married	0.117	0.033**	-0.037	0.057
self_employed	-0.072	0.036*	-0.013	0.047
paid_work	-0.031	0.029	-0.078	0.037*
lower_secondary_educ	0.160	0.085		
pre_univ_secondary_educ	0.300	0.093**		
higher_vocational_educ	0.363	0.087**		
university_educ	0.414	0.090**		
Female	-0.181	0.032**		
Age	0.025	0.001**		
<i>Sigma(individual effect)</i>	0.8666		1.2019	
<i>Sigma(error term)</i>	0.8552		0.8854	
<i>Observations</i>	19,719		19,719	
<i>Individuals</i>	5545		5545	

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; standard errors clustered at the individual level and robust to heteroscedasticity. Time dummies included in both specifications but not presented

As argued above, the results in Tables 2 and 3 may not reflect causal effects, due to reverse causality: pension knowledge may affect whether a respondent remembers and reports receiving a pension statement. To identify a causal effect, we use the timing of events: pension knowledge at time  $t$  may affect whether someone reports having received a pension overview at time  $t$ , but it seems very plausible that it will not affect whether someone reported having received a pension statement one year earlier (at time  $t-1$ ). This essentially means that the lagged value of *received\_UPO* can be used as an instrument for the current value of *received\_UPO*. In order to make this a valid instrument, the dynamics of pension knowledge need to be properly accounted for. Moreover, we also want to allow for fixed individual effects. This can all be achieved in the dynamic panel data model of Arellano and Bond (1991), using a GMM estimator in first differences. The exact set of moments used in estimation depends on the exact nature of the assumptions on the nature of endogeneity of *Received\_UPO*. The other control variables are

assumed to be strictly exogenous (i.e., independent of the error terms in all time-periods). Moreover, to increase the efficiency of the estimator, moments in levels can be added assuming stationarity, following Blundell and Bond (1998). Tests on the validity of all or a subset of moment assumptions are used to select an appropriate model.<sup>15</sup>

Table 4 presents four sets of GMM estimates of a dynamic model explaining the objective measure *pen\_lit*. The first two specifications (“2 lags”) assume that *Received\_UPO* is not influenced by future values of pension knowledge but can be affected by current pension knowledge. The final two specifications (“1 lag”) make the stronger assumption that *Received\_UPO* is not influenced by current pension knowledge (but can be influenced by pension knowledge in the past). Specifications 1 and 3 also use moments in levels (“system GMM”), whereas specifications 2 and 4 only use moments in first differences (“Diffs only”). Specification 3 is rejected by two of the four specification tests. The assumptions of the other specifications are not rejected by any of the tests. Note that specification 4 is not rejected by the data, although it assumes that there is no immediate effect of pension knowledge on the answer to the question whether someone received a uniform pension overview. If this assumption is indeed valid, then specification 4 provides evidence in favour of a causal effect of pension information on pension knowledge.

All four models indicate that current pension knowledge depend upon last year’s knowledge, although the size of this effect seems rather small (between 0.087 and 0.141). The specifications lead to very different conclusions concerning the influence of receiving a pension overview. According to the final two specifications (including specification 4 which is the preferred model according to the tests), receiving a pension statement has a small positive effect on pension knowledge that is significant at the 5% level according to specification 4. According to the first two specifications on the other hand (the preferred specifications from an economic plausibility point of view), this effect is not significant at the 5% level and the point estimate is even negative.

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<sup>15</sup> We used the Stata 14 command `xtabond2`; see Roodman (2009).

Table 4. GMM estimates of models for objective pension knowledge (*pen\_lit*)

Pen Lit	System GMM, 2 lags	Diffs only, 2 lags	System GMM, 1 lag	Diffs only, 1 lag
Pen Lit (t-1)	0.135 (0.028)***	0.086 (0.031)***	0.141 (0.027)***	0.087 (0.031)***
Rec. UPO	-0.321 (0.196)	-0.268 (0.158)*	0.065 (0.037)*	0.088 (0.038)**
paid_work	0.021 (0.046)	-0.064 (0.059)	-0.014 (0.040)	-0.085 (0.057)
self_empl.	-0.087 (0.106)	0.057 (0.123)	-0.064 (0.102)	0.082 (0.121)
main_earn	0.385 (0.047)***	0.015 (0.078)	0.358 (0.043)***	0.037 (0.079)
own_house	0.412 (0.058)***	-0.101 (0.089)	0.392 (0.055)***	-0.127 (0.084)
married	0.275 (0.045)***	0.032 (0.084)	0.274 (0.044)***	0.061 (0.081)
hh_size	-0.108 (0.017)***	-0.030 (0.042)	-0.105 (0.017)***	-0.022 (0.042)
_cons	1.051 (0.162)***		0.812 (0.098)***	
<i>AB test m(2)</i>	1.53	0.89	1.81	1.10
<i>(p-value)</i>	(0.125)	(0.373)	(0.071)	0.273
<i>Hansen J-test</i>	76.05 0.056	29.38 (0.809)	78.89 (0.035)	29.90 (0.790)
<i>Hansen diff test level moments</i>	20.66 (0.480)		24.26 (0.281)	
<i>Hansen diff test exogenous variables</i>	36.51 (0.710)	7.01 (0.973)	45.58 (0.000)	9.77 (0.878)
<i>Observations</i>	7,147	4,785	7,147	4,785
<i>Individuals</i>	2034	1382	2034	1382

Notes: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ . Time dummies included in all regressions but not presented. Two step system GMM estimates with robust standard errors. Standard errors of parameter estimates and p-values of test statistics in parentheses. See main text for details on the four specifications.

Somewhat surprisingly, the effects of the other control variables sometimes differ from the results in Table 1, even though these variables are assumed to be strictly exogenous in both cases. The reason may be the unbalanced nature of the panel, implying that the set of observations used for estimation declines substantially when lagged variables are used. This also reduces the precision of the estimates.

Table 5. GMM estimates of models for subjective pension knowledge (*feel\_informed*)

Feel_inf	System GMM, 2 lags	Diffs only, 2 lags	System GMM, 1 lag	Diffs only, 1 lag
Feel_inf (t-1)	0.099 (0.023)***	0.063 (0.023)***	0.099 (0.023)***	0.065 (0.023)***
Rec_UPO	0.082 (0.215)	-0.106 (0.282)	0.139 (0.036)***	0.145 (0.042)***
paid_work	-0.136 (0.048)***	0.068 (0.062)	-0.153 (0.038)***	0.056 (0.060)
self_empl	-0.108 (0.067)	0.017 (0.073)	-0.107 (0.051)**	0.034 (0.072)
main_earn	0.380 (0.051)***	-0.070 (0.086)	0.373 (0.041)***	-0.088 (0.086)
own_hse	0.435 (0.056)***	-0.067 (0.092)	0.429 (0.050)***	-0.045 (0.094)
married	0.309 (0.043)***	-0.007 (0.088)	0.305 (0.042)***	0.006 (0.086)
hh_size	-0.112 (0.017)***	0.021 (0.042)	-0.114 (0.016)***	0.013 (0.042)
AB-test $m(2)$ (p-value)	1.38 (0.168)	0.63 (0.531)	1.38 (0.168)	0.68 (0.495)
Hansen J-test (p-value)	105.62 (0.004)	44.67 (0.486)	95.14 (0.025)	41.52 (0.620)
Hansen diff test level moments	34.01 (0.108)		32.79 (0.136)	
Hansen diff test exogenous variables	55.35 (0.000)	21.65 (0.248)	52.82 (0.000)	21.98 (0.233)
Observations	13,478	9,349	13,478	9,349
Individuals	3409	2346	3409	2346

Notes: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ . Time dummies included in all regressions but not presented. Two step system GMM estimates with robust standard errors. Standard errors of parameter estimates and p-values of test statistics in parentheses. See main text for details on the four specifications.

Table 5 presents the same results as Table 4 for models explaining the subjective measure of pension knowledge, *feel\_informed*. The results are somewhat similar. The specifications using moments in levels are rejected by the specification tests, but the two specifications using moments in differences are not supported by the data. Specification 4 assumes there is no reverse causality (no effect of feeling informed on reporting having received a pension overview) and gives a significant and positive effect of receiving a pension statement on subjective pension knowledge. To interpret the size of the effect, recall that *feel\_informed* is measured on a scale from 1 to 6, with a mean of 3.76 and a standard deviation of 1.33, so even for this specification, the coefficient on receiving a pension statement seems

rather small: keeping everything else constant, receiving a pension overview increases the feeling of being informed by about one ninth of a standard deviation.

## 4.2 Models explaining active pension decision-making

Table 6 presents the results of linear probability models explaining the dummy variable for active pension decision-making, cf. Figure 1.<sup>16</sup> The coefficients on the objective and subjective indexes of pension knowledge are both positive and strongly significant according to the random effects as well as the fixed effects model. (In fact, the size of the coefficients is only somewhat larger if the other index is dropped from the equation.) Conscious decision-making is positively associated with pension knowledge, controlling for the other variables and for time persistent unobservables. Like before, we cannot claim that this necessarily reflects a causal effect – it might be that, for example, getting more involved in pensions due to some exogenous event not only leads to more active and conscious decision making but also to an effort that increases pension knowledge. Note that the differences between FE and RE estimates are substantial – the RE estimates are about twice as large. This suggests that some time-persistent unobservable factors drive pension knowledge and conscious decision-making in the same way. Indeed, formal (Hausman) tests of the RE assumption that individual effects are not correlated with the pension knowledge regressors lead to the conclusion that the RE assumption is violated.

Table 6. Random and Fixed Effects Models for Active Pension Planning

Active decision	RE	FE	RE	FE
received_UPO	0.031 (0.009)**	0.009 (0.011)	-0.000 (0.010)	0.005 (0.012)
PenLit_all			0.068 (0.005)**	0.033 (0.007)**
feel_informed			0.040 (0.004)**	0.024 (0.005)**
main_earner	0.005 (0.012)	-0.016 (0.020)	-0.008 (0.014)	-0.026 (0.023)

<sup>16</sup> Logit models with fixed or random gives qualitatively very similar results as the corresponding linear models. Using only two pension literacy questions (and including observations in 2016 and 2017) also gives qualitatively similar results. Results are available upon request.

hh_size	-0.023 (0.005)**	-0.005 (0.009)	-0.025 (0.005)**	-0.000 (0.011)
own_house	0.076 (0.013)**	-0.009 (0.028)	0.036 (0.015)*	-0.057 (0.032)
Married	-0.002 (0.012)	0.020 (0.022)	-0.007 (0.014)	0.018 (0.026)
self_employed	-0.012 (0.016)	-0.027 (0.025)	0.021 (0.024)	-0.009 (0.035)
paid_work	0.000 (0.011)	-0.030 (0.015)	-0.010 (0.014)	-0.039 (0.021)
lower_secondary_educ	0.066 (0.029)*		0.059 (0.031)	
pre_univ_secondary_educ	0.113 (0.033)**		0.056 (0.035)	
higher_vocational_educ	0.176 (0.030)**		0.136 (0.032)**	
university_educ	0.278 (0.032)**		0.225 (0.035)**	
female	-0.049 (0.013)**		0.000 (0.015)	
age	0.005 (0.001)**		0.003 (0.001)**	
<i>Sigma(individual effect)</i>	0.2953	0.4308	0.2784	0.4218
<i>Sigma(error term)</i>	0.3829	0.3829	0.3818	0.3817
<i>Observations</i>	16,886	16,886	12,359	12,359
<i>Individuals</i>	5,124	5,124	3,934	3,934

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; standard errors clustered at the individual level and robust to heteroscedasticity. Time dummies included in both specifications but not presented.

Keeping pension knowledge and other regressors constant, the effect of receiving a pension overview on active decision-making is essentially zero. This instrument of pension communication may therefore have an indirect effect by improving pension knowledge (Section 4.1), but there is no evidence that in addition, it would have a direct effect. In the fixed effects model, none of the other control variables is significant. According to the random effects estimates, there is no significant difference between men and women once we control for the two measures of pension literacy. Respondents with higher education, older respondents, and respondents in smaller households are more conscious decision makers than others. As before,

these associations may reflect correlation between these explanatory variables and time-persistent individual traits driving conscious decision-making.

We follow the same identification approach as in Section 4.1 to estimate the causal effect of pension knowledge and receiving a pension overview on conscious pension decision-making. Fixed effects are eliminated by taking first differences, and lagged values are used as instruments for pension knowledge and the dummy *received\_UPO*. We always use at least two lags to construct instruments for the lagged endogenous variables in the model.<sup>17</sup> The main identifying assumption is that pension knowledge and receiving a pension statement can be affected by (the unpredictable part of) past decisions, but not by current or future values of the same variables. Selected GMM estimates are presented in Table 7.<sup>18</sup> The first specification can be seen as a reduced form where active decision making is directly regressed on the receiving a pension statement dummy and other covariates, ignoring the information on pension knowledge. The other specifications introduce objective and/or subjective pension knowledge as a (potentially endogenous) explanatory variable. None of the specification tests reject any of the four selected specifications at the 5% level.

The results clearly suggest that there is a positive effect of pension knowledge on our index of conscious pension decision making. Both objectively and subjectively measured pension knowledge are significant at the 5% level, even if both are included at the same time (specification 2). An increase in the objective (subjective) score raises the probability of conscious decision-making by 13.0 (9.8) percentage points, keeping other factors constant.

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<sup>17</sup> Using one lag does not change the substantive conclusions.

<sup>18</sup> We tried adding a lagged dependent variable also to specifications 2-4 but this was not significant.



Table 7. GMM estimates of models for active pension decision-making

Active decision	system GMM, lag 2	system GMM, lag 2	system GMM, lag 2	system GMM, lag 2
Active decision (t-1)	0.061 (0.022)***			
received_UPO	0.120 (0.106)	0.017 (0.091)	0.022 (0.104)	0.161 (0.093)*
feel_informed		0.098 (0.050)**		0.142 (0.038)***
PenLit_all		0.130 (0.049)***	0.171 (0.052)***	
main_earner	0.070 (0.022)***	-0.026 (0.029)	-0.009 (0.028)	-0.001 (0.023)
own_house	0.130 (0.024)***	0.037 (0.032)	0.057 (0.031)*	0.063 (0.025)**
married	0.030 (0.018)*	-0.037 (0.025)	-0.018 (0.023)	-0.023 (0.020)
hh_size	-0.048 (0.007)***	-0.032 (0.009)***	-0.035 (0.009)***	-0.032 (0.007)***
<i>AB test m(2)</i> <i>(p-value)</i>	1.82 (0.062)	0.37 (0.715)	0.00 (0.998)	0.99 (0.321)
<i>Hansen J-test</i>	84.90 (0.108)	73.50 (0.849)	51.27 (0.753)	74.52 (0.364)
<i>Hansen diff</i> <i>test level</i> <i>moments</i>	32.78 (0.137)	33.90 (0.329)	25.39 (0.231)	33.91 (0.110)
<i>Hansen diff</i> <i>test lagged</i> <i>dep variables</i>	23.97 (0.156)	9.33 (0.899)	14.70 (0.546)	16.10 (0.446)
<i>Observations</i>	10,014	12,359	12,359	16,886
<i>Individuals</i>	2939	3934	3934	5124

Notes: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ . Time dummies included in all regressions but not presented. Two step system GMM estimates with robust standard errors. Standard errors of parameter estimates and p-values of test statistics in parentheses.

On the other hand, in line with the results in Table 6, the effect of receiving a pension statement is much less clear. In the reduced form, the effect is positive but not significant. Only if we include the subjective but exclude the objective measure of pension knowledge, the parameter on receiving pension information becomes marginally significant (specification 4). If both measures of pension knowledge are kept constant, the estimated effect of receiving pension information is essentially zero (specification 2). This suggests that if sending a pension

overview leads to more active pension planning, then this is fully mediated by pension knowledge.

## **5. Conclusions**

Many countries spend a lot of effort and money on pension communication, with the goal to inform individuals and help them to make better pension-related decisions. Little is known about the effectiveness of these communication strategies. In this study we use the gradual introduction of the annual pension overview (UPO) for all Dutch employees with an occupational pension to estimate the effect of providing information on pension knowledge and active pension planning. We have longitudinal data following a large sample of individuals over a long time period and exploit the timing of events to identify the effects of interest. The empirical results suggest that providing an annual pension statement might have a small positive effect on pension knowledge. This result, however, is sensitive to the identifying assumptions. The second main finding is that pension knowledge has a positive causal effect on active pension decision making. This finding is much more robust than the former. Keeping pension knowledge constant, we do not find a significant (direct) effect of providing pension information on pension knowledge.

There is abundant evidence that (general) financial literacy has a positive effect on thinking about retirement in many countries (Lusardi and Mitchell, 2011), including the Netherlands (Van Rooij et al., 2012). Our finding that (specific) pension knowledge of pensions induces conscious pension decision making is clearly in line with this. On the other hand, the literature on the effectiveness of various tools to improve financial and pension literacy is inconclusive (cf., e.g., Lusardi et al., 2017 and Fernandes et al., 2014). For the Dutch uniform pension overview in particular, policy makers have already concluded that the content and size of the document must be geared more towards helping individuals instead of fulfilling the legal obligation to provide correct (and complete) information. But even then, the lack of pension awareness and conscious pension decision-making in many countries, irrespective of their pension systems and communication policies, suggest that information provision alone will not be enough to guarantee optimal pension-decisions of individuals. Eliminating opportunities for

poor choices and designing a choice architecture that prevents inferior decisions for most individuals can be much more effective instruments to improve the quality of pension related decisions without taking away individuals' own responsibility for an adequate pension.

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